

What is claimed is:

[Claim 1] What is claimed is:

An apparatus in a drill string, comprising:

an internally upset drill pipe comprising a first end, a second end, and an elongate tube intermediate the first and second ends,
the elongate tube and the ends comprising a continuous inside surface with a plurality of inside diameters;
a conformable spirally welded metal tube expanded within the drill pipe intermediate the ends thereof and terminating adjacent to the ends of the drill pipe;
wherein the conformable spirally welded metal tube substantially conforms to the continuous inside surface.

[Claim 2] The apparatus of claim 1 wherein the metal tube is more corrosion resistant than drill pipe.

[Claim 3] The apparatus of claim 1 wherein the metal tube has a rough outside surface.

[Claim 4] The apparatus of claim 1 wherein the metal tube is expanded to conform to the drill pipe using hydraulic pressure.

[Claim 5] The apparatus of claim 1 wherein the metal tube is expanded inside the drill pipe by being drawn over a mandrel.

[Claim 6] The apparatus of claim 1 wherein the apparatus comprises an insulating material between the metal tube and the inside surface.

[Claim 7] The apparatus of claim 6 wherein the insulating material resists galvanic corrosion between the metal tube and the inside surface.

[Claim 8] The apparatus of claim 1 wherein the metal tube is adapted to stretch with the drill pipe.

[Claim 9] The apparatus of claim 1 wherein the metal of the metal tube is selected from the group consisting of steel, stainless steel, titanium, aluminum, copper, nickel, chrome, and molybdenum, or compounds, mixtures, and alloys thereof.

[Claim 10] The apparatus of claim 1 wherein the metal tube comprises a non-uniform section expanded to conform to the inside surface of the drill pipe.

[Claim 11] The apparatus of claim 10 wherein the metal tube has a regular end portion that is free of the non-uniform section.

[Claim 12] The apparatus of claim 10 wherein the non-uniform section comprises protrusions selected from the group consisting of convolutions, corrugations, flutes, and dimples.

[Claim 13] The apparatus of claim 10 wherein the non-uniform section extends generally longitudinally along the length of the elongate tube.

[Claim 14] The apparatus of claim 10 wherein the non-uniform section extends spirally along the surface of the tube.

[Claim 15] The apparatus of claim 10 wherein the non-uniform section is intermediate regular end portions of the metal tube.

[Claim 16] The apparatus of claim 10 wherein the non-uniform section is formed using hydraulic pressure.

[Claim 17] The apparatus of claim 10 wherein the non-uniform section is formed by roll forming or by stamping.

[Claim 18] The apparatus of claim 1 wherein one or more dies are used to form the non-uniform section of the tube.

[Claim 19] The apparatus of claim 1 wherein inside surface comprises a transition region forming a convex region and a concave region in the inside surface.

[Claim 20] The apparatus of claim 19 wherein a resilient ring is disposed with the concave region.